CLAIMS

What is claimed is:

1. A thermally assisted sealing arrangement, comprising:

(a) a fluid containment member;

(b) a joining structure adapted to interface with said fluid containment member, said fluid containment member and said joining structure cooperating to form an annular sealing cavity interposed between said fluid containment member and said joining structure, said sealing cavity having a central portion and two end portions, one of the end portions being radially inward of the central portion with the other end portion being radially outward of the central portion, each of said end portions of the cavity being configured to converge in a direction away from the central portion; and

(c) an annular sealing member disposed in said sealing cavity, said sealing member being operative to change radial dimension in response to temperature changes by an amount that is substantially different than the change of radial dimension of the cavity in response to temperature changes, whereby a change in temperature will tend to cause the sealing member to move radially relative to the cavity into one of the converging end

portions of the cavity and enhance the sealing pressure between the sealing member and the end portion of the cavity.

2. A thermally assisted sealing arrangement as recited in claim 1 wherein the annular sealing member has a coefficient of thermal expansion that is substantially different than the coefficient of thermal expansion of the cavity and whereby such differences in the coefficients of thermal expansion result in the differential changes in radial dimension of the sealing member and the cavity.

3. A thermally assisted sealing arrangement as recited in claim 2 wherein the coefficient of thermal expansion of the sealing member is greater than the coefficient of thermal expansion of the cavity.

4. A thermally assisted sealing arrangement as recited in claim 3 wherein the sealing member tends to move radially outwardly relative to the cavity in response to an increase in temperature to wedge material of the sealing member into the radially outwardly converging portion of the cavity and wherein the sealing member tends to move radially inwardly relative to the cavity in response to a decrease in temperature to wedge material from the sealing member into the radially inwardly converging portion of the cavity.

5. A thermally assisted sealing arrangement as recited in claim 1 wherein the fluid containment member and the joining structure cooperate to compressingly engage

the interposed sealing member and to urge the sealing member from a preformed cross-sectional shape to cross-sectional shape corresponding to the shape of the cavity.

6. A thermally assisted sealing arrangement as recited in claim 1 wherein the fluid containment member and the joining structure compressingly engage the interposed sealing member to urge material from the sealing member to flow into the converging end portions of the sealing cavity.

7. A thermally assisted sealing arrangement as recited in claim 3 wherein the sealing member is formed of a fluorinated hydrocarbon polymer material.

8. A thermally assisted sealing arrangement as recited in claim 7 wherein the sealing member is formed of polytetrafluoroethylene.

9. A thermally assisted sealing arrangement as recited in claim 3 wherein the fluid containment member and joining structure are formed of metal.

10. A thermally assisted sealing arrangement as recited in claim 3 wherein the fluid containment member and the joining structure are formed of plastic.

11. A thermally assisted sealing arrangement as recited in claim 1 wherein the annular sealing cavity formed by the fluid containment member and joining structure has a diamond-shaped cross-sectional area.

12. A thermally assisted sealing arrangement as recited in claim 11 wherein the annular sealing member has a substantially consistent cross-sectional shape throughout its circumference.

13. A thermally assisted sealing arrangement as recited in claim 12 wherein the second cross-sectional shape of the annular sealing member is circular.

14. A thermally assisted sealing arrangement as recited in claim 12 wherein the second cross-sectional shape of the annular sealing member is rectangular.

15. A thermally assisted sealing arrangement as recited in claim 14 wherein the second cross-sectional shape of the annular sealing member is square.

16. A thermally assisted sealing arrangement as recited in claim 12 wherein the second cross-sectional shape of the annular sealing member is a rhombus.

17. A thermally assisted sealing arrangement as recited in claim 1 further including clearance gaps at opposite ends of the sealing cavity wherein the converging end portions of the cavity converge to and communicate with the clearance gaps, the

annular sealing member extending at least partially into the clearance gaps at each end of the sealing cavity.

18. In combination with a valve, a thermally assisted sealing arrangement, comprising:

(a) a valve body, said valve body having an inlet, a outlet and a first fluid flow passage extending between the inlet and the outlet;

(b) a joining structure interfacing with said valve body, said joining structure having a second flow passage, said first and second flow passages being in fluid communication with each other to form a fluid flow path, said valve body and said joining structure cooperating to form an annular sealing cavity circumferentially disposed about the flow path and interposed between said valve body and said joining structure, said sealing cavity having a central portion and two end portions, one of the end portions being radially inward of the central portion with the other end portion being radially outward of the central portion, each of said end portions of the cavity being configured to converge in a direction away from the central portion; and

(c) an annular sealing member disposed in said sealing cavity, said sealing member having a thermal coefficient of expansion that is substantially different than the thermal coefficient of expansion of the sealing cavity, whereby differential temperature induced dimensional changes of the sealing member relative to the cavity will urge the sealing member to move radially relative to the cavity into one of the converging end portions of the cavity thereby tending to enhance the sealing pressure between the sealing member and the end portion of the cavity.

19. A thermally assisted sealing arrangement as recited in claim 18 wherein the coefficient of thermal expansion of the sealing member is greater than the coefficient of thermal expansion of the cavity.

20. A thermally assisted sealing arrangement as recited in claim 18 wherein the sealing member tends to move radially outwardly relative to the cavity in response to an increase in temperature to wedge material of the sealing member into the radially outwardly converging portion of the cavity and wherein the sealing member tends to move radially inwardly relative to the cavity in response to a decrease in temperature to wedge material from the sealing member into the radially inwardly converging portion of the cavity.

21. A thermally assisted sealing arrangement as recited in claim 18 wherein the valve body and the joining structure cooperate to compressingly engage the interposed sealing member and to urge the sealing member from a preformed cross-sectional shape to cross-sectional shape corresponding to the shape of the cavity.

22. A thermally assisted sealing arrangement as recited in claim 18 wherein the valve body and the joining structure compressingly engage the interposed sealing member to urge material from the sealing member to flow into the converging end portions of the sealing cavity. [dog bone claim, not to be dependent upon immediately preceding claim]

23. A thermally assisted sealing arrangement as recited in claim 19 wherein the sealing member is formed of fluorinated hydrocarbon polymer material.

24. A thermally assisted sealing arrangement as recited in claim 20 wherein the sealing member is formed of polytetrafluoroethylene.

25. A thermally assisted sealing arrangement as recited in claim 19 wherein the valve body and joining structure are formed of metal.

26. A thermally assisted sealing arrangement as recited in claim 19 wherein the valve body and the joining structure are formed of plastic.

27. A thermally assisted sealing arrangement as recited in claim 18 wherein the annular sealing cavity formed by the valve body and joining structure has a diamond-shaped cross-sectional area.

28. A thermally assisted sealing arrangement as recited in claim 19 wherein the annular sealing member has a substantially consistent cross-sectional shape throughout its circumference.

29. A thermally assisted sealing arrangement as recited in claim 28 wherein the second cross-sectional shape of the annular sealing member is circular.

30. A thermally assisted sealing arrangement as recited in claim 28 wherein the second cross-sectional shape of the annular sealing member is rectangular.

31. A thermally assisted sealing arrangement as recited in claim 28 wherein the second cross-sectional shape of the annular sealing member is square.

32. A thermally assisted sealing arrangement as recited in claim 28 wherein the second cross-sectional shape of the annular sealing member is a rhombus.

33. A thermally assisted sealing arrangement as recited in claim 18 further including clearance gaps at opposite ends of the sealing cavity wherein the converging end portions of the cavity converge to and communicate with the clearance gaps, the

annular sealing member extending at least partially into the clearance gaps at each end of the sealing cavity.

34. A method of sealing an interface between two components, comprising:

(a) providing between the two components an annular cavity with a first predetermined cross-sectional shape, the predetermined cross-sectional shape including a central portion and two end portions with one of the end portions being radially inward of the central portion and the other end portion being radially outward of the central portion, each of said end portions being configured to converge in a direction away from the central portion;

(b) interposing into the cavity an annular sealing member having a second predetermined cross-sectional shape that differs from the first predetermined cross-sectional shape and is formed of a material having a coefficient of thermal expansion that differs from the coefficient of thermal expansion of the cavity; and

(c) moving the two components toward each other to compressingly engage the interposed sealing material and forcing material of the sealing material to flow into the converging end portions of the cavity so that differential

rates of thermal expansion and contraction between the sealing material and the cavity will wedge the sealing material into the converging end portions of the cavity.

35. A method as recited in claim 34 wherein the second cross-sectional shape of the annular sealing member is circular.

36. A method as recited in claim 34 wherein the second cross-sectional shape of the annular sealing member is rectangular.

37. A method as recited in claim 36 wherein the second cross-sectional shape of the annular sealing member is square.

38. A method as recited in claim 34 wherein the second cross-sectional shape of the annular sealing member is a rhombus.

39. A method as recited in claim 34 wherein the annular cavity provided further includes clearance gaps at opposite ends of the sealing cavity and wherein the converging end portions of the cavity converge to and communicate with the clearance gaps, and wherein the two components are moved toward each other to compressingly engage the annular sealing member and to extrude sealing material at least partially into the clearance gaps at each end of the sealing cavity.